Utility of the Awake Video Laryngoscopy Assisted Fibreoptic Intubation Technique in Maxillofacial Gunshot Injury - A Case Report

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Abstract

Rationale: Maxillofacial gunshot injury leads to significant soft tissue and bone defects, which compromise airway patency, thus posing a challenge for the anaesthesiologist. The utility of the videolaryngoscopy-assisted fibreoptic intubation (VAFI) technique in maxillofacial gunshot injury has not yet been described in the literature. **Patient Concerns:** We report the case of a young male presenting with extensive maxillofacial wounds with fractures of the bilateral maxilla, mandible and floor of orbit secondary to self-inflicted gunshot injury. **Diagnosis:** Major peri-operative concerns included anticipated difficult airway, control of potential haemorrhage and airway oedema. **Treatment:** A flexible fibreoptic bronchoscope used in combination with a video laryngoscope was used to successfully secure the airway. **Outcome:** He was extubated on the same day and discharged after two weeks. **Take-Away Lessons:** The current case highlights the safe and effective use of the videolaryngoscopy-assisted fibreoptic intubation technique in maxillofacial gunshot injury.

Keywords: Difficult airway, fibreoptic bronchoscope, gunshot injury, maxillofacial trauma, videolaryngoscope

Introduction

Facial gunshot injury frequently leads to a difficult airway due to the loss of critical support to the floor of the mouth, tongue prolapse and posterior displacement of the mandible.[1,2] Video laryngoscopy has been reported to be superior to direct conventional laryngoscopy in improving visualisation of the glottis; however, distorted airway anatomy leads to difficulty in the manipulation of the tube through the glottic aperture.[1] The use of a sole flexible fibreoptic bronchoscope (FOB) is limited by the presence of bleeding, secretions and a narrow tunnel view.[2] Hence, the combined use of both video laryngoscopy to obtain a wide panoramic view of the periglottic area, followed by FOB-guided manipulation of the tube around the distorted anatomy into the glottic aperture, facilitates successful intubation and avoids front-of-neck access.[3,4] This is the first case report describing the utility of the awake video laryngoscopy-assisted fibreoptic intubation (VAFI) technique in maxillofacial gunshot injury.

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Case Report

A 35-year-old male patient suffering from depression presented with an alleged history of an accidental high-velocity gunshot wound to the face, leading to an extensive open burst injury extending from the mandible to the base of the skull [Figure 1a]. Primary resuscitation was done following the Advanced Trauma Life Support (ATLS) Guidelines. The patient was conscious, obeying commands and sitting upright with the head extended to breathe comfortably. He was able to maintain his airway, produce incomprehensible sounds and swallow. On presentation, there was tachycardia (134 beats/min) and

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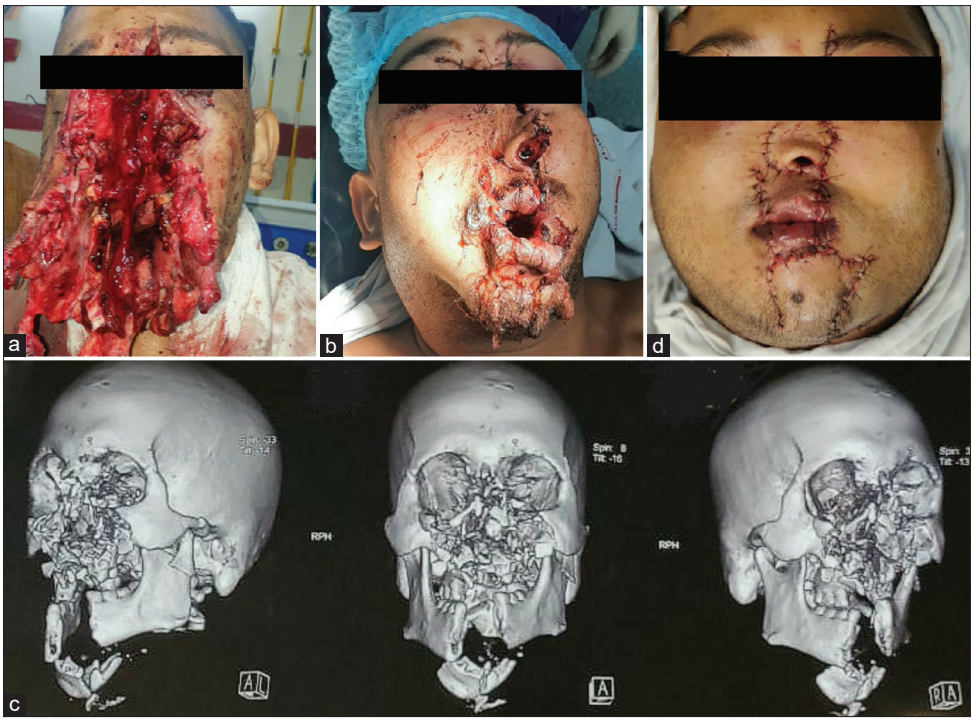

Figure 1: (a) Image depicting the extensive facial injury following a gunshot wound (b) Image of the patient post-primary closure of the defect in the emergency bay area. (c) Three-dimensional comminuted fractures of the maxilla, mandible and floor of the orbit (d) Image of the patient post-layered repair and open reduction and internal fixation of the mandible

hypotension (90/60 mmHg). We resuscitated using crystalloids and supplemented oxygen (15L/min) using a non-rebreathing face mask. We also supplemented analgesia with intravenous fentanyl (50 µg), oral suction with a finger sweep was done and the oropharynx was cleared of debris. His vitals gradually stabilised, and he underwent primary closure of the defect under local anaesthesia in the emergency area [Figure 1b]. A computed tomography scan with three-dimensional reconstruction revealed comminuted fractures of the bilateral maxilla and the mandible [Figure 1c]. There was no radiological evidence of intracranial/cervical spine injury. Pre-anaesthetic airway examination revealed adequate mouth opening, partial tongue prolapse, Mallampati class 3 view, submandibular space oedema and normal range of neck motion. Inside the operation theatre, standard monitoring with bispectral index (BIS) monitoring was instituted. The difficult airway cart (face masks, conventional and video laryngoscopes with a selection of blades, stylets, oropharyngeal airways, supraglottic airway devices, flexible bougies, cricothyroid puncture kit and FOB) was kept ready, with the otolaryngologist team on standby for tracheostomy. Patient was preoxygenated using a face mask with gauze and the circle system circuit (fresh gas flow of 12L/min) to obtain a tight seal across the large defect. He was then sedated with intravenous fentanyl (100 µg), and propofol was administered, titrated to BIS of 60–70, maintaining spontaneous respiration, and supplemented with a nasal prongs (4L/min) throughout the procedure. Laryngoscopy was performed using a C-MAC® video laryngoscope, D-Blade (Karl Storz, Tuttlingen, Germany) which lifted the tongue and epiglottis providing a wide panoramic Cormack–Lehane grade 3 view of the glottic aperture. We initially attempted to pass a gum-elastic bougie which proved unsuccessful. In the second attempt, the treating anaesthesiologist used the C-MAC® video laryngoscope, D-Blade (Karl Storz, Tuttlingen, Germany), to provide an adequate view of periglottic structures, while another anaesthesiologist used the FOB as a flexible stylet with the endotracheal tube placed over the scope. The tip of the FOB was then manoeuvred around the distorted anatomy, through the vocal cords, and the endotracheal tube was secured, following which rocuronium (70 mg) was administered. The patient then underwent debridement and layered soft tissue repair and intermaxillary fixation with a 25-reconstruction plate [Figure 1d].

The surgical procedure was uneventful, and the patient was shifted out on T-piece (6-8L/min oxygen flow) after attainment of full consciousness, reversal of neuromuscular block and generation of adequate tidal volume (450 mL). He was extubated after eight hours after confirmation of the absence of airway oedema using the cuff-leak test and after administration of dexamethasone (8 mg). He also underwent psychiatric assessment and treatment for depression. He was discharged after two weeks, and his three month follow-up was also uneventful.

Discussion

A literature review revealed that 6% of gunshot wounds involve the maxillofacial region, of which 50% were

attempted suicide and 17.4% of cases needed emergency airway control due to local oedema/haematoma.[5] Shotguns which was the weapon in our case used at a close range led to significant tissue destruction. Management consists of initial stabilisation, followed by definitive reconstruction and secondary refinement.[1,2]

Maintaining airway patency was our primary concern, which could be adversely affected by the posteroinferior displacement of the maxilla or bilateral fracture of the anterior mandible.[2] It can also be compromised by bony fragments, bleeding, laryngotracheal injury and soft tissue oedema.[6] Diminished consciousness and altered airway reflexes reported in some cases predispose to aspiration.[3] The trachea should be palpated to rule out any deviation/partial collapse, and the larynx should be auscultated for stridor.[2,6]

There is a 10% incidence of reported concomitant cervical spine injuries.[5] A spinal collar must be applied, and manoeuvres such as the jaw thrust and chin lift should be used with caution.[2]

We anticipated difficult mask ventilation in our patient due to large soft-tissue defects and the presence of comminuted mandibular fractures. In addition, there was a partial prolapse of the tongue secondary to the loss of musculature of the tongue base. The fibreoptic technique, the gold standard in difficult airway management, is limited by the presence of displaced mandibular and maxillary fractures with significant soft-tissue injury, leading to difficulty in visualisation and manipulation around anatomical landmarks with the use of a sole FOB. FOB-guided intubation also necessitates the use of the jaw thrust, which was used with caution in our patient due to displaced mandibular fractures. This can be avoided with the use of C-MAC® D-Blade (Karl Storz, Tuttlingen, Germany) laryngoscope which improves glottic visualisation with less force applied to the base of the tongue, reducing soft tissue injury and displacement.

However, the manipulation of the tube through the distorted airway anatomy proved difficult in our case. These challenges were overcome using a combination of both, i.e., the VAFI technique described by Sanfilippo *et al*.[7] The FOB used as a flexible stylet can be manipulated through distorted anatomy into the trachea.[7] Loh and Ng reported faster intubating time and less trauma using the VAFI technique in three patients with traumatic maxillofacial fractures.[8] The successful use of the VAFI technique has been reported in patients with Cowden syndrome, large goitre and cadaveric difficult airway models.[3,9]

The video laryngoscope provides better visualisation and creates space within the airway for effective suctioning and tube advancement, which is monitored under direct vision reducing the potential for airway trauma.[3] The limitations of the awake VAFI technique include the need and coordination between two anaesthesiologists, maintenance of adequate sedation and technical FOB expertise.

Front-of-neck access was kept on standby as tracheostomy and cricothyrotomy are associated with complications such as bleeding (5.7%), stomal infections (6.6%), subcutaneous emphysema (0%–5%), posterior tracheal wall injury (0.2%–12.5%) and tracheostomy tube obstruction.[10]

Thorough assessment, meticulous preparation and critical decision-making are essential for successfully managing a difficult airway. The index case highlights the safe and effective use of the VAFI technique to secure the airway in maxillofacial gunshot wounds.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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